EXHIBIT 6

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Paper 8
Date: October 16, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MASIMO CORPORATION,
Petitioner,

v.

APPLE INC.,
Patent Owner.

IPR2023-00745
Patent 10,076,257 B2

Before KEN B. BARRETT, JOSIAH C. COCKS, and ROBERT L. KINDER, *Administrative Patent Judges*.

KINDER, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. Background and Summary

Masimo Corporation ("Petitioner")[1] filed a Petition requesting *inter partes* review of claims 1–4 and 8–22 of U.S. Patent No. 10,076,257 B2 ("the '257 patent," Ex. 1001). Paper 1 ("Pet."). Apple Inc. ("Patent Owner")[2] filed a Preliminary Response to the Petition. Paper 7 ("Prelim. Resp.").

We have authority to determine whether to institute an *inter partes* review, under 35 U.S.C. § 314 and 37 C.F.R. § 42.4. An *inter partes* review may not be instituted unless it is determined that "the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314 (2018); *see also* 37 C.F.R. § 42.4(a) ("The Board institutes the trial on behalf of the Director.").

For the reasons provided below and based on the record before us, we determine that Petitioner has demonstrated a reasonable likelihood that Petitioner would prevail in showing the unpatentability of at least one of the challenged claims. Accordingly, we institute an *inter partes* review on all grounds set forth in the Petition.

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[1] Petitioner identifies Masimo Corporation as the real party-in-interest. Pet. 2.

[2] Patent Owner identifies Apple Inc. as the real party-in-interest. Paper 3.

B. Related Proceedings

Both parties identify, as a matter involving the '257 patent, *Apple Inc. v. Masimo Corporation and Sound United, LLC*, No. 1:22-cv-01378-MN (D. Del.). Pet. 2; Paper 3.

C. The '257 Patent

The '257 patent is titled "Seamlessly Embedded Heart Rate Monitor" and "is directed to an electronic device having an integrated sensor for detecting a user's cardiac activity and cardiac electrical signals." Ex. 1001, codes (54), (57). The '257 patent's "seamlessly integrated cardiac sensor . . . can be integrated in any suitable portion of the electronic device" including "a portion with which the user is typically in contact (e.g., an input mechanism or a housing held by the user), or metallic or conductive portions of the device." *Id.* at 2:6–13. The '257 patent illustrates, in Figure 1, a schematic view of an electronic device for receiving the output of one or more sensors, and in Figure 3, a schematic view of the elements (including integrated leads) of the electronic device. *Id.* at 3:22–29.

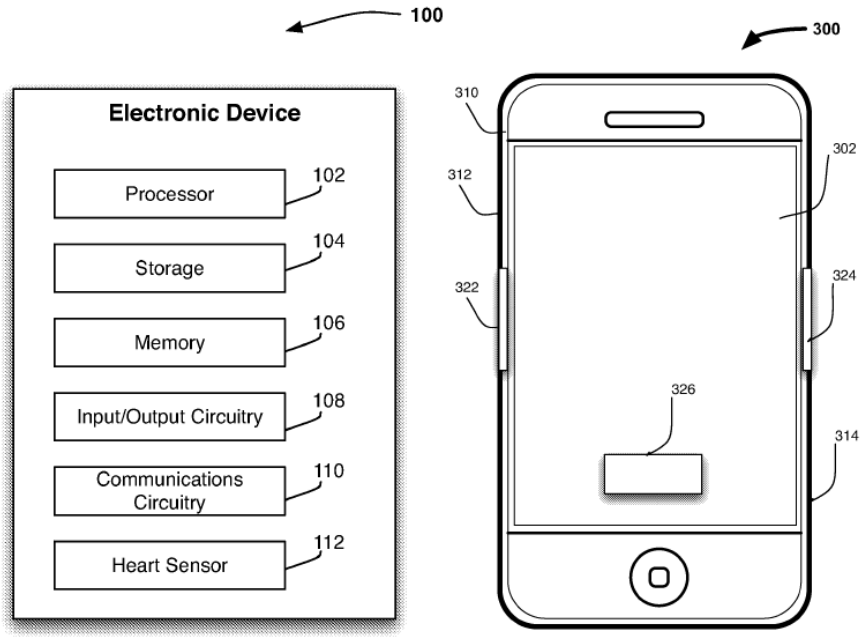

FIG. 1 FIG. 3

Figure 1 is a schematic view of an electronic device 100 for receiving the output of one or more sensors, and Figure 3 is a schematic view illustrating elements of such an electronic device having several integrated leads. *Id.* at 3:47–49, 8:13–16.

As shown in Figure 1, electronic device 100 includes control circuitry 102, storage 104, memory 106, input/output circuitry 108, communications circuitry 110, and heart sensor 112. *Id.* at 3:49–61. Control circuitry 102 includes processing circuitry or a processor operative to control the operations and performance of electronic device 100. *Id.* at 3:62–4:2. The control circuitry may be used to run operating system applications, firmware applications, media playback applications, media editing applications, and may also drive a display and process inputs received from a user interface. *Id.* Input/output circuitry 108 is operative to convert analog signals and other signals into digital data, and digital data into any other type of signal. *Id.* at 4:32–46. Input/output circuitry 108 may receive and convert physical contact inputs (e.g., from a multi-touch screen), physical movements (e.g.,

from a mouse or sensor), analog audio signals (e.g., from a microphone), or other input. *Id.* The digital data may be provided to, and received from, processor 102, storage 104, memory 106, heart sensor 112, or other component of electronic device 100. *Id.* Heart sensor 112 is operative to detect a user's heartbeat, heart rate, or other signal generated by the user's heart. *Id.* at 6:3–16. Thus, heart sensor 112 may serve as an EKG monitor. *Id.* Heart sensor 112 may include lead(s) connected to the exterior of the electronic device such that the user may contact one or more of the leads to provide an electrical signal associated with the user's heart to heart sensor 112. *Id.* The leads may be integrated in any suitable portion of the electronic device. *Id.* at 8:10–13. Figure 3 illustrates an electronic device having such integrated leads. *Id.* at 8:13–15. Cardiac signals detected by the heart sensor leads are analyzed by the processor, which generates, from the received signals, one or more characteristic quantities of the user's heartbeat or heart rate for authentication. *Id.* at 6:10–16.

Electronic device 300 illustrated in Figure 3 includes display 302 and bezel 310, and is portable such that a user can hold the electronic device with fingers extending against one of sides 312 and 314 of bezel 310, and the user's thumb extending against the other of sides 312 and 314. *Id.* at 8:15–40. Leads 322 and 324, which may include conductive pads, may be coupled to sides 312 and 314 of bezel 310, respectively, such that when the user holds the device, the user's thumb and fingers are placed in contact with leads 322 and 324. *Id.* Alternatively, bezel 310 may include any other suitable number of leads, or any other suitable distribution of leads along bezel 310 and in other portions of electronic device 300. *Id.* The leads detect the user's cardiac activity through the contact with the user's thumb

and fingers, and provide the detected activity to the electronic device processor for processing. *Id.*

Electronic device 300 may also include additional lead 326 embedded in or behind display 302, as shown in Figure 3. *Id.* at 8:40–52. Lead 326 is operative to detect a user's heart activity as the user moves a finger across display 302, for example in the vicinity of or directly over lead 326 (e.g., as the user drags a finger over lead 326 to move a slider when unlocking the electronic device). *Id.* Using lead 326, the electronic device can detect an electrical signal from a different portion of the user's body (e.g., leads 322 and 324 detect signals through a first hand, and lead 326 detects signals through the second hand), which can provide the processor with additional information for determining characteristics of the user's cardiac activity. *Id.*

To prevent leads 322, 324 and 326 from shorting, electronic device 300 may include at least one non-conductive component positioned between each of leads 322, 324 and 326: for example, a rubber gasket can be positioned between leads 322 and 324 (in bezel 310) and lead 326 (in display 302). *Id.* at 8:53–60.

The '257 patent explains that the cardiac electrical signals detected by leads 322, 324, and 326 may be faint or have particular characteristics that require materials having particular properties (e.g., silver-based compounds) to detect and transmit. *Id.* at 8:59–9:3. In such cases, although the material used for bezel 310 or other electronic device components can be conductive, its conductivity can be insufficient to transmit signals detected by lead 322 directly to lead 324 (e.g., shorting leads 322 and 324). *Id.* In accordance with the '257 patent, this may allow leads 322 and 324 to be embedded directly in bezel 310 without the need for additional isolating material. *Id.*

Figures 4A and 4B of the '257 patent, reproduced below, illustrate electronic devices having bezels with embedded heart sensor leads. *Id.* at 3:30–36.

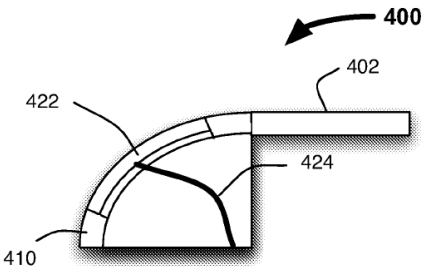

FIG. 4A

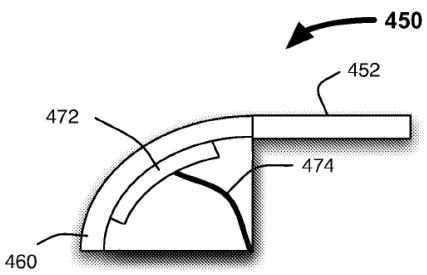

FIG. 4B

Figure 4A is a cross-sectional view of an electronic device 400 having a bezel 410 with an embedded heart sensor lead 422, and Figure 4B is a cross-sectional view of another electronic device 450 having a bezel 460 with an embedded heart sensor lead 472. *Id.* at 9:18–21, 9:35–40.

Electronic device 400 shown in Figure 4A includes display 402 and bezel 410. *Id.* at 9:18–35. Lead 422 may be embedded along the outer surface of bezel 410 such that lead 422 is exposed to the user during use. *Id.* Connector 424 may be coupled to the inner surface of lead 422 and extend into electronic device 400 to be coupled with the processor. *Id.* Electronic device 400 may further include an isolating layer positioned between lead 422 and bezel 410 (not shown in Figure 4A). *Id.* The isolating layer may be constructed from a suitable material having non-conductive properties. *Id.* Alternatively, if the material of bezel 410 is not conductive, or insufficiently conductive to cause several distinct leads 422 positioned on bezel 410 from shorting, no isolating layer may be necessary. *Id.*

Electronic device 450 in Figure 4B includes display 452 and bezel 460. *Id.* at 9:36–56. If the electrical conductivity and size of bezel 460, and the strength or characteristics of the cardiac signal provided by the user and

detected by the heart sensor are adapted such that the signal can be transmitted along short distances in bezel 460, lead 472 of the heart sensor may be positioned against the back surface of bezel 460. *Id.* Alternatively, lead 472 may be placed within the thickness of bezel 460 (e.g., in a pocket within the bezel wall), but underneath the outer surface of the bezel. *Id.* The short thickness of bezel 460 allows electrical signals to propagate from the user to the outer surface of bezel 460, through bezel 460, and into lead 472, which may in turn transmit the signals to the processor using connector 474. *Id.* In addition, if several leads are placed along different portions of bezel 460, the distance between adjacent leads may be sufficiently large (e.g., substantially larger than the thickness of bezel 460) that different leads of bezel 460 cannot detect the same electrical signal. *Id.*

D. Illustrative Claim

Claims 1 and 15 are independent claims. Claim 1, reproduced below, is illustrative.

> 1. An electronic device for detecting a user's cardiac signal, comprising:
>
> an enclosure;
>
> a heart sensor configured to detect the user's cardiac signal, the heart sensor comprising:
>
> a first lead comprising a first pad that is embedded in a first portion of the enclosure, wherein an exterior surface of the enclosure comprises an exterior surface of the first portion, wherein the first pad is positioned underneath the exterior surface of the first portion, and wherein the first pad is configured to detect a first electrical signal of the user's cardiac signal via the user's skin's contact with the exterior surface of the first portion of the enclosure; and
>
> a second lead comprising a second pad that is embedded in a second portion of the enclosure, wherein

> the second pad is configured to detect a second electrical signal of the user's cardiac signal via the user's skin's contact with at least one of the second pad and the second portion of the enclosure; and
>
> a processor coupled to the heart sensor and configured to receive and process the detected cardiac signal, wherein the first lead further comprises a first connector coupled to the first pad and configured to provide the first electrical signal detected by the first pad to the processor, and wherein the second lead further comprises a second connector coupled to the second pad and configured to provide the second electrical signal detected by the second pad to the processor.

Ex. 1001, 12:21–49. Independent claim 15 is similar in scope to claim 1, but uniquely requires "a display screen," and "a second lead embedded in the display screen." *Id.* at 14:1, 14:11.

E. Evidence

Petitioner relies on the following references:

Name	Reference	Exhibit(s)
Markel	US 2007/0021677 A1, pub. Jan. 25, 2007	1005
Mills et al.	US 5,351,695, iss. Oct. 4, 1994	1006

Petitioner also relies on the declaration of Alan L. Oslan, Ph.D. (Ex. 1003) in support of its arguments. Petitioner also relies on other exhibits as discussed below.

F. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §[3]	Reference(s)/Basis
1–4, 8, 10, 11, 14	102	Mills
1–4, 8–22	103	Markel, Mills

II. ANALYSIS OF PETITIONER'S CHALLENGES

A. Principles of Law

Petitioner bears the burden of persuasion to prove unpatentability of the claims challenged in the Petition, and that burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

"Under 35 U.S.C. § 102 a claim is anticipated 'if each and every limitation is found either expressly or inherently in a single prior art reference.'" *King Pharm., Inc. v. Eon Labs, Inc.*, 616 F.3d 1267, 1274 (Fed. Cir. 2010) (quoting *Celeritas Techs. Ltd. v. Rockwell Int'l Corp.*, 150 F.3d 1354, 1360 (Fed. Cir. 1998)). "Anticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim." *Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1325, 1332 (Fed. Cir. 2010) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)).

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[3] The Leahy-Smith America Invents Act ("AIA") includes revisions to 35 U.S.C. §§ 102 and 103 that became effective on March 16, 2013. Because the earliest filed application identified in the '257 patent has a filing date of at least as early as January 23, 2009 (Ex. 1001, code (63), 1:7–12), we apply the pre-AIA-versions of 35 U.S.C. §§ 102 and 103.

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4), if present, any objective evidence of obviousness or non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. The Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quoting *Custom Accessories, Inc. v. Jeffrey–Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)).

Petitioner contends that:

> A POSITA of the '257 patent would have at least a B.S. degree in electrical or biomedical engineering or a related field, with at least two years of experience designing patient monitoring or similar systems. A higher level of education may compensate for less work experience and vice versa.

Pet. 7 (citing Ex. 1003 ¶ 38).

Patent Owner, in turn, contends that:

> A person of ordinary skill in the art on or about the claimed priority date of the '257 Patent ("POSITA") would have had at least a bachelor's degree in electrical engineering, mechanical engineering, biomedical engineering, computer engineering, physics, or a related field, and would have had at least two years of relevant work experience with capture and processing of data or information, including but not limited to physiological information, or equivalents thereof. Less work experience may be compensated by a higher level of education and vice versa.

Prelim. Resp. 5–6.

The parties' recitations are similar in scope. Patent Owner's proposed level of ordinary skill in the art is somewhat broader in both education and proposed work experience. This proposed work experience is somewhat vague and potentially outside the scope of the claimed invention. For example, the requirement that the person of ordinary skill in the art have experience with the "capture and processing of data or information, including but not limited to physiological information," would seemingly encompass data processing areas that do not relate to the scope of the claimed invention.

Petitioner's definition is consistent with both the scope of the claimed invention and the level of ordinary skill reflected in the prior art references of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (recognizing that the prior art itself may reflect an appropriate level of skill in the art). For purposes of this Decision, we apply Petitioner's definition of the person of ordinary skill in the art. We note, however, that our decision would be the same adopting either proposed level of ordinary skill in the art.

C. Claim Construction

We apply the same claim construction standard used in district court actions under 35 U.S.C. § 282(b), namely that articulated in *Phillips v. AWH*

Corp., 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b). In applying that standard, claim terms generally are given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Petitioner proposes constructions for the terms "embedded" (recited in claims 1, 9, and 15), "lead" (recited in the independent claims), "pad" (recited in claim 1 and some of its dependent claims), and "pocket" (recited in dependent claim 8). Pet. 7–12.

Patent Owner, at this time, "discerns no need to construe explicitly any claim language because doing so would have no effect on analyses of Masimo's asserted grounds, and would not assist in resolving the present controversy between the parties." Prelim. Resp. 6.

With respect to the claim term "embedded," Petitioner submits that

> A POSITA would understand at the time of the '257 patent disclosure based on its usage in the specification, the claim term "embedded" means "*an integral part of*" such as, by "*being placed in the thickness of a surrounding material including forming an outer and/or inner surface*" or "*placed underneath an exterior surface and against an inner surface*."

Pet. 8–9 (citing Ex. 1001, 9:19–20, 9:22–24, 9:34–48, Fig. 4A–4B; Ex. 1003 ¶¶ 44–46; Ex. 1016, 406; Ex. 1017, 635; Ex. 1018, 583).

With respect to the claim term "lead," Petitioner submits that "a POSITA would understand a '**lead**' in context of the '257 patent to mean '*one or more conductive components that form at least a part of an electrical path from the user's skin to the processor*.'" Pet. 9–11 (citing Ex. 1001, 1:56–58, 2:44–50, 6:27–33, code (57); Ex. 1003 ¶¶ 47–51; Ex. 1019, 414; Ex. 1020, 1062).

With respect to the claim term "pad," Petitioner submits that an ordinarily skilled artisan would understand that "a '**pad**' in the context of the '257 patent means '*a thin mat that may be part of the electrical path of a lead, such as an electrode or a connection that is part of the lead*.'" Pet. 11–12 (citing Ex. 1001, 6:28-33; Ex. 1003 ¶ 52; Ex. 1016, 890).

With respect to the claim term "pocket," Petitioner submits that "a POSITA would understand the term **pocket** in the context of the '257 patent disclosure to be '*any pouchlike receptacle, compartment, hollow or cavity*.'" Pet. 12 (citing Ex. 1003 ¶ 53; Ex. 1021).

Although Petitioner's proposed claim constructions appear reasonable and supported, based on the current record before us, including the absence of any opposition from Patent Owner, we see no need for express construction of any term at this stage of the proceeding. For purposes of this decision, and based on the record before us, we determine that no express construction of any term is necessary. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy.'" (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Anticipation of Claims 1–4, 8, 10, 11 and 14 By Mills

Petitioner alleges that claims 1–4, 8, 10, 11 and 14 would have been anticipated by Mills. Pet. 12, 16–40. Patent Owner opposes. Prelim. Resp. 7–10. For reasons discussed below, we determine that Petitioner has shown a reasonable likelihood that it would prevail in its anticipation challenge based on Mills.

1. Mills (Ex. 1006)

Mills is titled "Wrist Worn ECG Monitor" and relates to "a wrist-worn ECG monitor having integral electrodes for recording and teletransmitting ECG data to a remote site for analysis by a diagnostician." Ex. 1006, codes (54), (57), 1:10–14. Mills' wrist-worn ECG monitor can be worn by a cardiac patient and includes fully integrated dry skin electrodes, as illustrated below in Figure 1 (in an isometric view), Figure 2 (in an exploded frontal isometric view with the wrist band removed), and Figure 3A (in an exploded isometric view showing the ECG monitor from the rear). *Id.* at 1:46–49, 3:1–5, 2:39–47.

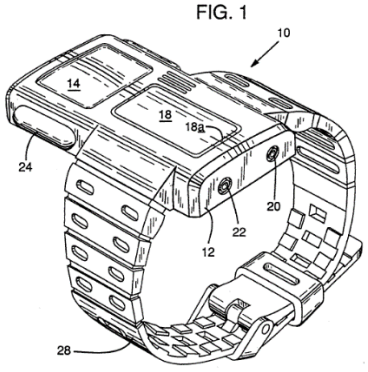

Figure 1 is an isometric view of a wrist-worn ECG monitor 10. Ex. 1006, 2:39–41.

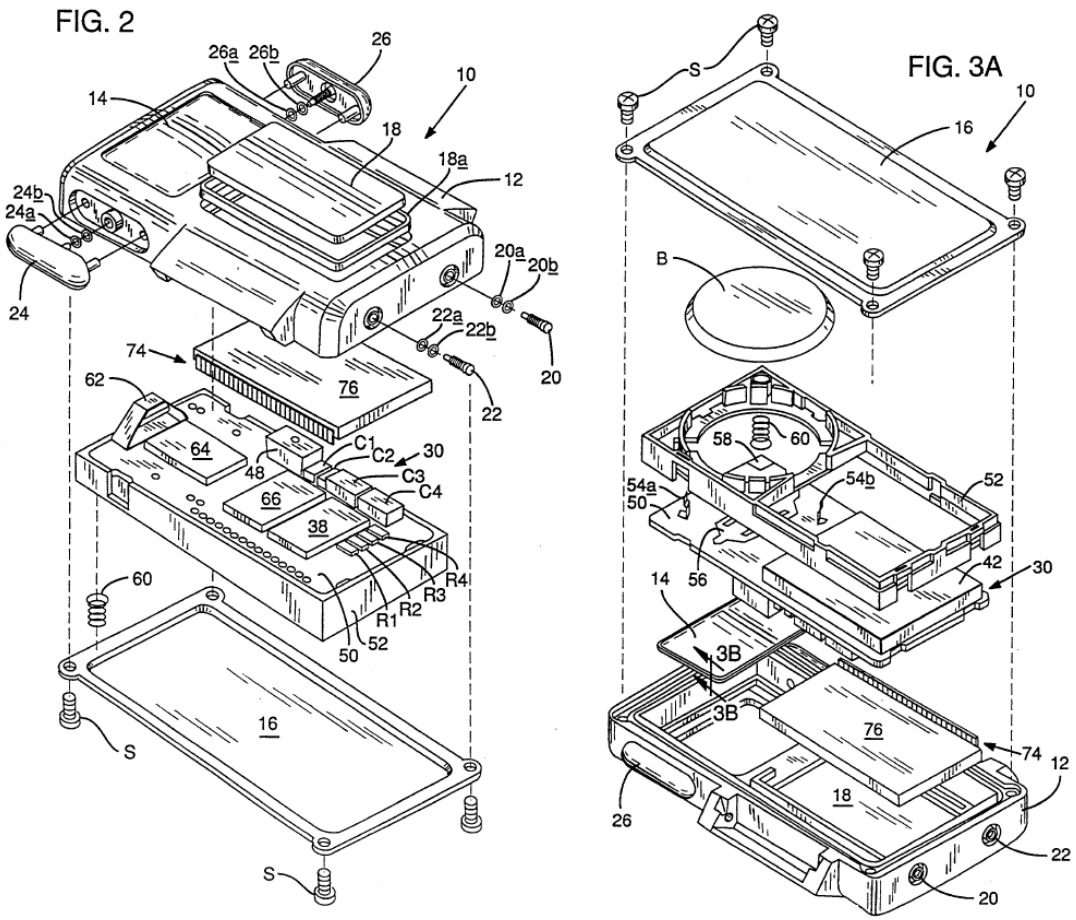

Figure 2 is a frontal isometric view of the ECG monitor 10 (with the wrist band removed), and Figure 3A is an exploded isometric view of the ECG monitor (shown from the rear instead of the front). Ex. 1006, 2:42–47.

The wrist-worn ECG (or cardiac data) monitoring apparatus 10 illustrated in Figures 1, 2, and 3A includes: (i) housing 12 including first and second dry skin electrodes 14 and 16 unitarily connected therewith and forming an integral part thereof (with electrode 14 integrally molded therein, and electrode 16 forming an integral part of the housing by the use of screws S turned into corresponding tapped holes formed therein) for making conductive contact with a cardiac patient's skin surface, and bezel 18 (with associated gasket 18a) also forming an integral part of the housing; (ii) plural pushbutton switches 20, 22, 24, and 26 which may be accessed by the

patient; (iii) a watchband 28; and (iv) electronics (indicated generally at 30 in Figure 2) which are entirely contained within housing 12. Ex. 1006, 3:6–18, 3:47–51.

Mills' wrist-worn ECG monitor enables local, multiple event ECG data recording and telecommunication to a remote site, and also provides time and date functions normally provided by a wristwatch. *Id.* at 1:61–65. The ECG monitor is operable by the patient by placing the other palm over a portion of the monitor's face to contact an upper skin electrode. *Id.* at 1:65–2:1. The ECG monitor's dry skin electrodes 14 and 16 are designed for use with equipment capable of producing or monitoring changing electrical conditions (indicative of changing cardiographic conditions) at the surface of a patient's skin, for, e.g., cardiac monitoring. *Id.* at 3:61–67. Mills further explains that

> [c]ustom very-large-scale integrated (VLSI) circuit components contained within the housing include ECG signal and abnormal event detection circuitry, analog-to-digital (AD) and digital-to-analog (DA) conversion circuitry, memory and processor circuitry for scanning the push-buttons and displaying selected chronometric, cardiac, and status information. Circuitry is also provided to drive an integral speaker for the telecommunication of ECG signal or cardiac event data via telephone lines to a remote site for so-called "over-read" diagnosis and archival recording[.]

Id. at 2:1–12.

Mills explains that electronics 30 may be implemented "in various discrete and integrated circuits surface-mounted or ultrasonic wire bonded onto a multi-layer printed circuit board (PCB) 50 supported within housing 12." *Id.* at 4:50–55. Thus, PCB 50 is used to mount and interconnect on its bottom side (shown in Figure 3A) various circuitry, including:

interconnecting and mounting support members 54a and 54b for connection with one terminal of a battery B; double-leaf spring member 56 for connection with the other terminal of battery B; a "land" or circuit pad 58 for connecting lower electrode 16 via coil spring 60 to one signal input terminal of ECG amplifier 32 (shown in Mills' Figure 4, reproduced *infra*); circuitry shown schematically in Figure 4, including microcontroller (with integral ROM) chip 42. *Id.* at 4:55–66. Upper electrode 14 is connected to the other signal input terminal of ECG amplifier 32 via a generally trapezoid-shaped, split, and thus slidably yielding, leaf spring 62 connected to a circuit pad formed on the top side of PCB 50. *Id.* at 4:67–5:3.

Other circuitry of electronics 30 is mounted to the top side of PCB 50 (as shown in Figure 2). *Id.* at 5:32–34. Such circuitry includes speaker 48, relatively smaller external decoupling capacitors C1 and C2 (which are too large to be integrated into the VSLI chips), relatively larger decoupling capacitors C3 and C4, and resistors R1, R2, R3, and R4 (one of which is a current sense resistor R illustrated in Figure 4). *Id.* at 5:34–49. Resistors R1, R2, R3, and R4 are either precision resistors, or resistors whose values are application- or operational mode-specific in the use of ECG monitor 10. *Id.* Speaker 48 is used to audibly communicate ECG data to a remote site, preferably over a voice channel (such as a telephone line), without the need for an external connection or transmitter. *Id.* at 5:54–60.

Figure 4 of Mills, reproduced below, is a schematic block diagram of Mills' ECG monitor. *Id.* at 2:50–51.

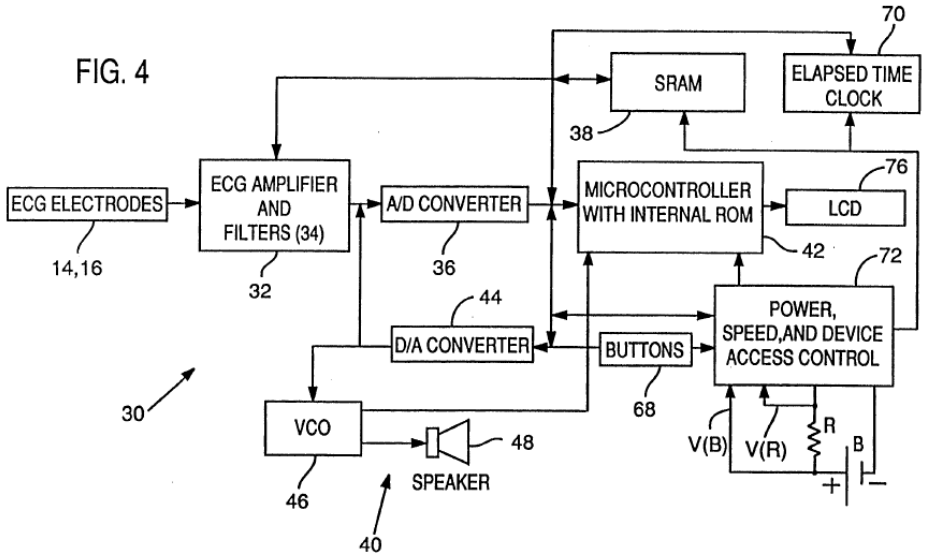

Figure 4 is a schematic block diagram of Mills' ECG monitor. *Id.* at 2:50–51.

The schematic block diagram illustrated in Figure 4 illustrates a circuit structure performing power management, chronometric, ECG signal conditioning and digitizing, demand data recording, and trans-telephonic communication functions for ECG monitor 10. *Id.* at 6:46–56. The illustrated circuit structure is contained within housing 12 of ECG monitor 10, with the exception of electrodes 14 and 16 (which form an integral, unitary part of housing 12, as shown in Figure 1). *Id.* As shown in Figure 4, electronics 30 include ECG signal amplifier 32—including hardware filters 34 coupled with electrodes 14 and 16 for producing an analog signal representative of the electrical field on the surface of the patient's skin between electrodes 14 and 16. *Id.* at 3:19–39. Electronics 30 also include an analog-to-digital converter (ADC) 36 connected with amplifier 32 for producing digital data representing the patient's ECG waveform over a predefined interval of time. *Id.* Electronics 30 also preferably include 32-kilobytes (32-kb) of static read-and-write memory (SRAM) 38 (a VLSI chip

surface-mounted on the top side of PCB 50) that operates as means for recording digital data produced by ADC 36. *Id.* at 3:19–39, 5:18–20.

Electronics 30 further includes means 40—preferably including a microcontroller with 8-kb of read-only memory (ROM) 42, digital-to-analog converter (DAC) 44, voltage-controlled oscillator (VCO) 46 and speaker 48—for wirelessly, and preferably audibly, communicating data recorded in SRAM 38 to a remote site for verification, real-time diagnosis, and/or archival recording. *Id.* at 3:19–39. ECG amplifier 32, including associated hardware input signal filters 34 (as shown in Figure 4), are implemented in a custom analog chip-on-board (e.g., an application-specific integrated circuit (ASIC) 64 shown in Figure 2), which is mounted on PCB 50 by ultrasonic wire-bonding techniques. *Id.* at 5:3–17. A custom digital (ASIC) chip-on-board 66 implements ADC 36, DAC 44, VCO 46, pushBUTTONS logic 68, an elapsed-time clock 70, and POWER, SPEED, and DEVICE ACCESS CONTROL logic 72. *Id.* Custom analog and digital chips 64 and 66 may be "formed on conventional substrates, [and] may have any desired layout as determined by speed/power requirements and conventional VLSI chip design rules and tools." *Id.* Cardiac monitoring and other status information are provided by selectively activating masked segments of LCD 76 to provide visible alphanumeric, graphic, and symbolic indicia of the operation of ECG monitor 10. *Id.* Chip 66 also includes digital logic circuitry that permits microcontroller 42 to select various operational parameters. *Id.* at 6:15–32.

In operation, ECG monitor 10 is worn on the wrist of the cardiac patient like a conventional wrist watch. *Id.* at 6:57–7:6. With monitor 10 positioned, e.g., on the left wrist, the palm of the right hand can be placed

into contact with upper electrode 14, thus impressing between upper electrode 14 and lower electrode 16 a signal representative of the patient's cardiography (as indicated by a varying electrical potential at the patient's skin surface). *Id.* When the recording of a cardiac waveform is desired, the patient depresses pushbutton 26, effecting a "demand" recording of what may prove to be an arrhythmic cardiac waveform representing an abnormal cardiac event. *Id.* Microcontroller 42 monitors pushbuttons 20, 22, 24, and 26 continuously for momentary closure, via pushbuttons logic 68 and power, speed and device access control 72. *Id.* at 7:6–15. Upon the depression of pushbutton 26, microcontroller 42 supplies power to ECG amplifier 32 and to ADC 36, and then provides a delay of a few seconds, which provides time for the user to position the palm on upper electrode 14, and for the ECG signal to stabilize. *Id.* After the delay, microcontroller 42 stores, or captures, ECG data input via ECG electrodes 14 and 16, ECG amplifier 32, and ADC 36, in SRAM 38 as a cardiac data record. *Id.* at 7:15–28. Such a stored ECG data record is available for immediate or delayed playout. *Id.*

2. Independent Claim 1.

Petitioner contends that claim 1 would have been anticipated by Mills. Pet. 16–33. Patent Owner opposes. Prelim. Resp. 7–10.

> *[Preamble] "An electronic device for detecting a user's cardiac signal, comprising:"*

On this record, the cited evidence supports Petitioner's undisputed contention that Mills discloses an electronic device for detecting a user's cardiac signal. Pet. 16 (citing Ex. 1006, code (57); Ex. 1003 ¶ 56). Accordingly, for the foregoing reasons and on this preliminary record, to the extent the preamble is limiting, Mills supports Petitioner's contentions.

1[a][4] "an enclosure"

Petitioner argues persuasively that Mills discloses an enclosure because Mills' electronic device 10 for detecting a user's cardiac signal includes a housing 12. *Id.* (citing Ex. 1006, 3:7–8, Fig. 1).

1[b] "a heart sensor configured to detect the user's cardiac signal, the heart sensor comprising"

Petitioner argues Mills discloses heart sensor because Mills' wrist-worn ECG monitor 10 "reliably detects and records ECG signals" and includes two electrodes 14 and 16. Pet. 17 (citing Ex. 1006, 1:11–12, 1:39–40, 9:12–15, Abstr., Figs 1 and 3A). Accordingly, for the foregoing reasons and on this preliminary record, Mills supports Petitioner's contentions.

1[b(i)] "the heart sensor comprising: a first lead comprising a first pad"

Petitioner argues Mills discloses such a first lead because Mills' electrode 14 "is a pad that forms part of the first lead of Mills." Pet. 18–19 (citing Ex. 1006, 4:19–24, 4:67–5:3, 7:16–18, Fig. 1). Petitioner relies on Mills' disclosure explaining that "electrode 14 comprising such plated expanse obviates use of a messy, conductive gel, and even the so-called 'residue-free' self-adhesive gelatinous pads that often are used to enhance conductivity between an electrode and a patient's skin," and "microcontroller 42 stores, or captures, ECG data input via ECG electrodes 14, 16." Ex. 1006, 4:19–24, 7:16–18. Based on these disclosures and the specification of the '257 patent stating that a "lead can include a pad or extended area placed on the outer . . . surface of an electronic device . . . housing" and which can then be "coupled to a wire or other connector for

[4] We use the bracketed designations added by Petitioner (*see* Pet. 16–32).

providing cardiac signals to a processor for processing," Mr. Oslan testifies that "[e]lectrodes 14 and 16 are both on the outer surface of the device housing and therefore are the pads described in the '257 patent." Ex. 1003 ¶ 59. Accordingly, for the foregoing reasons and on this preliminary record, we find Petitioner's contentions persuasive.

1[b(ii)] "[a first pad that is] embedded in a first portion of the enclosure"

Petitioner argues Mills discloses a first pad that is embedded in a first portion of the enclosure because "Mills discloses its electrode 14 (first pad) is 'integrally molded' (*i.e.*, embedded) into the housing [12]" and electrode 14 "also has a base material embedded underneath an outer surface coating." Pet. 19–24 (citing Ex. 1006, 3:8–11, 3:67–68, 4:2–5, 4:35–39, 4:43–47, 4:65–5:3, Figs 1, 2, and 3A–3B). Accordingly, for the foregoing reasons and on this preliminary record, Mills supports Petitioner's contentions.

1[b(iii)] "wherein an exterior surface of the enclosure comprises an exterior surface of the first portion"

Petitioner argues Mills discloses this limitation because "Fig. 1 of Mills . . . discloses a housing 12 with electrode[]14 which is a first portion forming part of the exterior surface of Mills" and "electrode 14 (first portion) has an exterior surface 14b shown in Fig. 3B." Pet. 24 (citing Ex. 1006, 2:16–20, Fig. 3B). Accordingly, for the foregoing reasons and on this preliminary record, Mills supports Petitioner's contentions.

1[b(iv)] "wherein the first pad is positioned underneath the exterior surface of the first portion"

Petitioner argues Mills discloses this limitation because "embedded lead 14a is underneath or covered by the exterior surface 14b" as depicted below in Petitioner's annotated Figure 3B. Pet. 24–25 (citing Ex. 1006, 4:43–47, Figs. 2 and 3B).

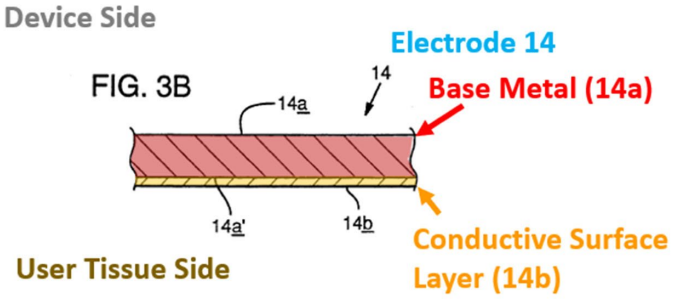

Figure 3B is a is an enlarged, fragmentary cross-sectional view of the lower electrode shown in Figure 3A with Petitioner's annotations of: "Electrode 14," "Base Metal (14a)," and "Conductive Surface Layer (14b)." *Id.* at 2:48–49.

Accordingly, for the foregoing reasons and on this preliminary record, Mills supports Petitioner's contentions.

> *1[b(v)] "wherein the first pad is configured to detect a first electrical signal of the user's cardiac signal via the user's skin's contact with the exterior surface of the first portion of the enclosure"*

Petitioner argues Mills discloses this limitation because "Mills discloses that when the cardiac data apparatus 10 is positioned on the left wrist, the palm of the right hand is placed into contact with upper electrode 14." Pet. 26 (citing Ex. 1006, 6:63–7:1). Petitioner relies on Mills' disclosure that "[d]ry skin electrodes 14, 16 are designed for use with equipment capable of producing or monitoring changing electrical conditions (indicative of changing cardiographic conditions) at the surface of a patient's skin, and are particularly suitable in cardiac monitoring, e.g. by apparatus 10." *Id.* (citing Ex. 1006, 3:62–67). Petitioner next explains how Mills' "leaf spring 62 carries the electrical signal from the electrode 14 through the leaf spring 62 via the leaf spring's top pad to a printed circuit

board (PCB), PCB 50 of Mills and ultimately to microcontroller chip 42 of Mills." *Id.* (citing Ex. 1006, 4:55–60, 4:68–5:3; Ex. 1003 ¶ 60).

Based on the preliminary record before us, Mills supports Petitioner's contentions.

1[b(vi)] "the heart sensor comprising . . . a second lead comprising a second pad"

Petitioner argues Mills discloses such a second lead because "[e]lectrode 16 of Mills . . . is a second pad and coil spring 60 is a leadwire" and "[e]lectrode 16 and coil spring 62 form a second lead." Pet. 27 (citing Ex. 1006, 3:8–9, 4:17–19, 8:10, Fig. 2). Accordingly, for the foregoing reasons and on this preliminary record, Mills supports Petitioner's contentions.

1[b(vii)] "[a second pad that is] embedded in a second portion of the enclosure"

Petitioner argues Mills discloses this limitation because "[e]lectrode 16 is embedded into the housing 12 because a portion of electrode 16 is inset (placed in the thickness) into a groove (surrounding material) of housing 12 and forms an outer surface." Pet. 28–30 (citing Ex. 1006, 1:12–13, 3:47–51, 4:10–13, Figs. 3A–3B). Accordingly, for the foregoing reasons and on this preliminary record, Mills supports Petitioner's contentions.

1[b(viii)] "wherein the second pad is configured to detect a second electrical signal of the user's cardiac signal via the user's skin's contact with at least one of the second pad and the second portion of the enclosure"

Petitioner contends "Mills discloses that when the cardiac data apparatus 10 is positioned on the left wrist, the electrode 16 is in contact with the user's skin of the left wrist thus providing an electrical signal representative of the patient's cardiography." Pet. 30 (citing Ex. 1006, 6:63–

7:1). Further, Mills discloses that "[d]ry skin electrodes 14, 16 are designed for use with equipment capable of producing or monitoring changing electrical conditions (indicative of changing cardiographic conditions) at the surface of a patient's skin, and are particularly suitable in cardiac monitoring, e.g. by apparatus 10." *Id.* (citing Ex. 1006, 3:62–67). Based on this preliminary, we find Petitioner's contentions persuasive.

> *1[c] "a processor coupled to the heart sensor and configured to receive and process the detected cardiac signal"*
>
> Petitioner argues Mills discloses such a processor because
>
> > Mills discloses that the housing 12 comprises a very-large scale integrated (VLSI) circuit chip that includes an "ECG signal and abnormal event detection circuitry, analog-to-digital (AD) and digital-to-analog (DA) conversion circuitry, memory and processor circuitry." EX1006, 2:3-6. Mills also discloses its "microprocessor and associated electronics, including firmware executed thereby, employs a digital bandpass filter reliably to detect ECG signals." EX1006, 2:20-23.

Pet. 31 (citing Ex. 1006, 2:3–6, 2:20–23, 4:55–5:3, 5:18–19). Petitioner further argues "that the VLSI is surface-mounted on the top side of printed circuit board (PCB) 50," and "[e]lectrodes 14 and 16 are electrically connected to the PCB 50 via a respective spring (60/62)." *Id.* (citing Ex. 1006, 4:55–5:3, 5:18–19). Thus, according to Petitioner and Mr. Oslan, "a POSITA [person of ordinary skill in the art] would understand the VLSI is a processor coupled to the heart sensor (electrodes) and is configured to receive and process the detected cardiac signal." *Id.* (citing Ex. 1003 ¶ 65).

Patent Owner argues Petitioner has failed to meet its burden for claim 1 with respect to the processor claim elements because "Masimo erroneously alleges that a memory component present in Mills is the claimed

processor." Prelim. Resp. 1. More specifically, Patent Owner contends that the VLSI chip that Petitioner refers to in column 5, lines 18–19 of Mills is a "SRAM chip 38" and "Masimo fails to demonstrate that the relied-upon SRAM memory is a processor." *Id.* at 7–8.

Patent Owner recognizes that "a VLSI chip can include a processor," because "the VLSI is a very-large scale integrated circuit chip," but "not a processor *per se*." *Id.* at 8. Patent Owner contends that "a 'static read-and-write ***memory (SRAM)*** . . . operates as means for recording digital data produced,' not as a signal processor." *Id.* (quoting Ex. 1006, 3:29–31) (citing *id.* at 5:18–19). Patent Owner alleges that Mills does not disclose a processing function for SRAM 38, and neither Mills nor Masimo's petition explains why a POSITA would have understood a memory device, such as SRAM 38, to include the processing functionality recited in claim 1. *Id.*

Finally, Patent Owner contends that "Masimo's Ground 1 analysis is further deficient because it shows only that an SRAM is coupled to the electrodes in Mills, and does not demonstrate disclosure of "***a processor*** [being] coupled to the heart sensor," as recited in claim 1." *Id.* at 8–9. Further, Patent Owner argues that "Masimo focuses on showing that electrodes 14, 16 in Mills are coupled to VLSI through their respective connections to a PCB, Masimo ignores the fact that the cited VLSI in Mills is a memory chip—i.e., an SRAM—rather than a processor," and thus "fails to show ***coupling*** of a heart sensor to a processor as required by independent claim 1." *Id.* at 9.

Based on the record before us, Petitioner has shown by a reasonable likelihood that Mills discloses "a processor coupled to the heart sensor and

configured to receive and process the detected cardiac signal," as required by claim 1.

We agree with Patent Owner that Petitioner's citation to Mills (Ex. 1006, 5:18–19), which is "[y]et another VLSI chip . . . SRAM chip 38," does not necessarily disclose a processor standing alone. Petitioner's position, however, does not rely just on SRAM chip 38, but instead a VLSI comprising other circuit components, including a distinct processor. *See* Pet. 31 (citing Ex. 1006, 2:3–6). Petitioner first cites to Mills column 2 to support its position that "housing 12 comprises a very-large scale integrated (VLSI) circuit chip that includes an 'ECG signal and abnormal event detection circuitry, analog-to-digital (AD) and digital-to-analog (DA) conversion circuitry, memory and processor circuitry.'" *Id.* (quoting Ex. 1006, 2:3–6). Petitioner next relies on Mills' disclosure that "microprocessor and associated electronics, including firmware executed thereby, employs a digital bandpass filter reliably to detect ECG signals." *Id.* (quoting Ex. 1006, 2:20–23).

Petitioner next cites to Mills (Ex. 1006, 4:55–5:3), which describes "circuitry shown schematically in FIG.4, including on [PCB 50's] bottom side a microcontroller (with integral ROM) chip 42." Pet. 31. It is unclear from this citation whether Petitioner is relying on microcontroller 42 (on PCB 50's bottom side) as a processor because Petitioner then quotes Mills' discussion of SRAM chip 38, which states "that the VLSI is surface-mounted on the top side of printed circuit board (PCB) 50." Pet. 31 (quoting Ex. 1006, 5:18–19).

We understand Petitioner's position as relying on the "very-large scale integrated (VLSI) circuit chip that includes" several components,

including "memory and processor circuitry." Pet. 31 (quoting Ex. 1006, 2:3–6). Notably, this section of the specification is labeled, "Background and Summary of the Invention," and the paragraph describing this VLSI circuit chip is "summarizing the invention." Ex. 1006, 1:7–8, 1:60. This VLSI circuit chip does not appear to us to be the same as VLSI SRAM chip 38, which is characterized by Mills as "[y]et another VLSI chip." Ex. 1006, 5:18. Mr. Oslan testifies that "the VLSI is a processor coupled to the heart sensor (first and second electrodes 14 and 16, respectively) and is configured to receive and process the detected cardiac signal." Ex. 1003 ¶ 65. Mr. Oslan relies on Mills' disclosure of a microprocessor and associated electronics, including firmware employing a digital bandpass filter for detecting ECG signals. *Id.* (citing Ex. 1006, 2:20–23). This cited sentence of Mills further discloses characterizing ECG signals (processing) based on QRS complexes or pacer and defibrillator pulses, but ignoring noise and motion artifacts. Ex. 1006, 2:20–25.

Patent Owner makes additional arguments, such as alleging that the processor discussed in column 2 of Mills is a distinct embodiment, and thus improper for use in an anticipation analysis. *See* Prelim. Resp. 10. Based on the record before us, we find these arguments are not well developed or supported.

Based on the testimony and evidence before us, Petitioner demonstrates by a reasonable likelihood that Mills discloses a processor that meets the requirements for claim 1. Accordingly, for the foregoing reasons and on this preliminary record, Mills supports Petitioner's contentions.

> *1[c(i)] "wherein the first lead further comprises a first connector coupled to the first pad and configured to provide the first electrical signal detected by the first pad to the processor"*

Petitioner argues Mills discloses this limitation because Mills' "leaf spring 62 is a first connector coupling electrode 14 (first pad) to the processor of Mills." Pet. 31–32 (citing Ex. 1006, 4:1–3, 4:67–5:3, Fig. 2). Accordingly, for the foregoing reasons and on this preliminary record, Mills supports Petitioner's contentions.

> *1[c(ii)] "wherein the second lead further comprises a second connector coupled to the second pad and configured to provide the second electrical signal detected by the second pad to the processor"*

Petitioner argues Mills discloses this limitation because "lead 16 [is] connected to the coil spring 60 which in turn connects to a circuit pad 58 on PCB 50 and the VLSI" such that "the electrical signals detected by the electrode 16 are passed via the coil spring 60 to the PCB 50 and then to the processor of the VLSI." Pet. 32–33 (citing Ex. 1006, 4:1–3, 4:55–5:3, Figs. 2 and 3A). Accordingly, for the foregoing reasons and on this preliminary record, Mills supports Petitioner's contentions.

Summary

For the foregoing reasons, we are persuaded that Petitioner's cited evidence demonstrates a reasonable likelihood that Petitioner would prevail in its anticipation contentions regarding claim 1.

3. Dependent Claims 2–4, 8, 10, 11, and 14.

Petitioner asserts that claims 2–4, 8, 10, 11, and 14 (which depend from claim 1) are anticipated by Mills. Pet. 12, 33–40.

We have reviewed the Petitioner's uncontested contentions and supporting evidence with respect to these claims. On the record before us,

we are persuaded that Petitioner's cited evidence demonstrates a reasonable likelihood that Petitioner would prevail in its anticipation contentions regarding claims 2–4, 8, 10, 11, and 14.

E. Obviousness of Claims 1–4 and 8–22 Over Markel and Mills

Petitioner alleges that claims 1–4 and 8–22 would have been obvious over Markel and Mills. Pet. 13, 40–84. Patent Owner opposes for reasons examined below. Prelim. Resp. 10–24. We first discus the scope and content of Markel and then examine independent claim 15.

For reasons discussed below, we determine that Petitioner has shown a reasonable likelihood that it would prevail in its obviousness challenge based on Markel and Mills.

1. Markel (Ex. 1005)

Markel is titled "Mobile Communication Device and Other Devices with Cardiovascular Monitoring Capability" and it relates to "a general-purpose mobile communication device (e.g., a cellular telephone, portable email device, personal digital assistant, etc.) comprising a communication interface module adapted to communicate with a general-purpose communication network, and at least one module operational to acquire cardiac information from a user of the general-purpose mobile communication device." Ex. 1005, codes (54), (57). Figure 1 of Markel, reproduced below, illustrates such a mobile communication device. *Id.* ¶ 6.

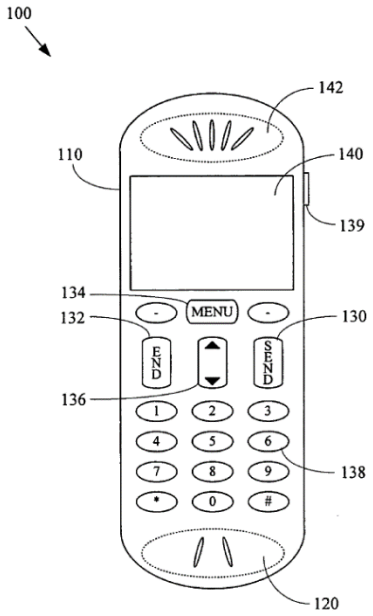

Figure 1

Figure 1 illustrates a mobile communication device 100 including a cardiac sensor. *Id.* ¶¶ 33, 35.

Mobile communication device ("MCD") 100 illustrated in Figure 1 may comprise characteristics of a cellular or portable telephone, of a personal digital assistant with mobile communication capability, portable email device, or pager. *Id.* ¶ 33. MCD 100 includes a main body portion 110, user input features (including a microphone 120), user output features (including a display 140 that may also function as a touch screen input feature, and a speaker 142), and pushbuttons (such as a send button 130, an end button 132, a menu button 134, a scroll button 136, a numeric button 138 and a volume control button 139). *Id.* ¶ 34. MCD 100 also includes "at least one cardiac sensor (e.g., one or more electrodes, an audio monitoring or acoustical detection device, etc.) that is adapted to detect cardiac activity of a user of the MCD 100." *Id.* ¶ 35. The electrodes may be adapted to detect cardiac activity of a user that is conductively coupled to the electrodes (e.g., by touching the electrodes). *Id.* Such electrodes may be incorporated into

MCD 100. *Id.* The electrodes include a conductive material. *Id.* ¶ 37. For example, an electrode may comprise a metallic surface exposed for user contact. *Id.* The electrode may also be formed from conductive plastic (or another material) that may be integrated into various molded components of the mobile communication device. *Id.* Electrodes may also be identified for the user in any of a variety of manners, or may be concealed (or hidden) from the user. *Id.* ¶¶ 39–40. For example, an electrode may include molded conductive plastic with little or no visible indication of the electrode presence. *Id.* ¶ 39.

The electrodes may be positioned such that the one or more electrodes contact a user during normal (or typical) use of MCD 100. *Id.* ¶ 41. Such normal use may include talking on a telephone, reading messages, perusing a phone book, typing a message, initiating a phone call, sending an email message, or entering information in a notepad. *Id.* For example, an electrode may be disposed on a pushbutton of MCD 100. *Id.* ¶ 42. As illustrated in Figure 1, an electrode may be disposed on alphanumeric pushbuttons (e.g., pushbutton 138), or on a send button 130, an end button 132, a menu button 134, a scroll button 136, or a volume control button 139. *Id.* An electrode may also be placed on a main body portion 110 of MCD 100. *Id.* ¶ 43. For example, main body portion 110 may include the portion of MCD 100 that is generally held in the hand during normal use of MCD 100. *Id.* One or more electrodes may also be placed on side or rear portions of main body portion 100. *Id.* An electrode may also be placed on (or proximate to) an audio output portion 142 (e.g., a speaker) of MCD 100, or on video display device 140. *Id.* ¶ 44.

Figure 4 of Markel is a diagram illustrating an MCD having electrodes disposed on a main body portion. *Id.* ¶¶ 9, 45.

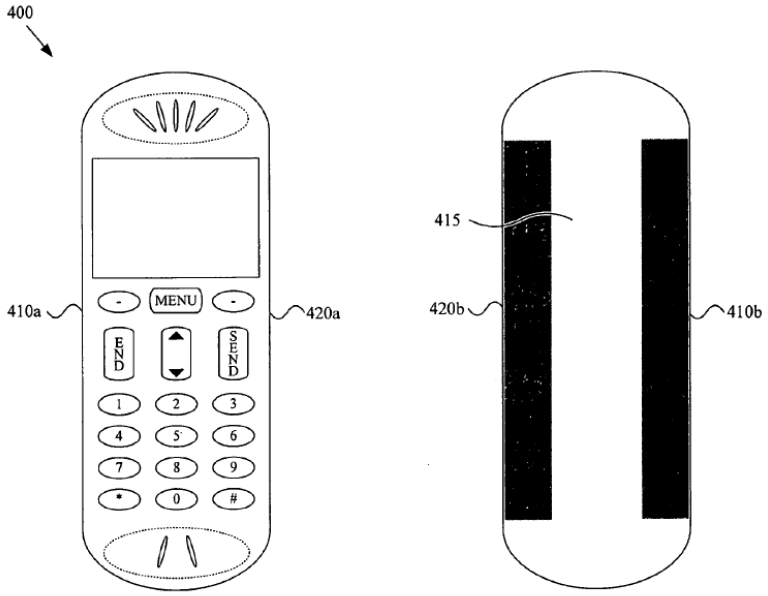

Figure 4

Figure 4 of Markel is a diagram illustrating a mobile communication device having electrodes disposed on a main body portion thereof. *Id.* ¶¶ 9, 45.

As shown in Figure 4, first and second electrodes may be disposed on main body portion 110 of MCD 400. *Id.* MCD 400 includes a left side portion 410 and a right side portion 420, with a first electrode placed on left side portion 410 (e.g., placed on or molded into region 410*b*), and a second electrode placed on right side portion 420 (e.g., placed on or molded into region 420*b*). *Id.* In a case where regions 410*b* and 420*b* include conductive plastic, an insulating region 415 may separate regions 410*b* and 420*b*. *Id.*

Figure 10 of Markel illustrates portions of an MCD 1000 including 2 or more electrodes. *Id.* ¶¶ 15, 58.

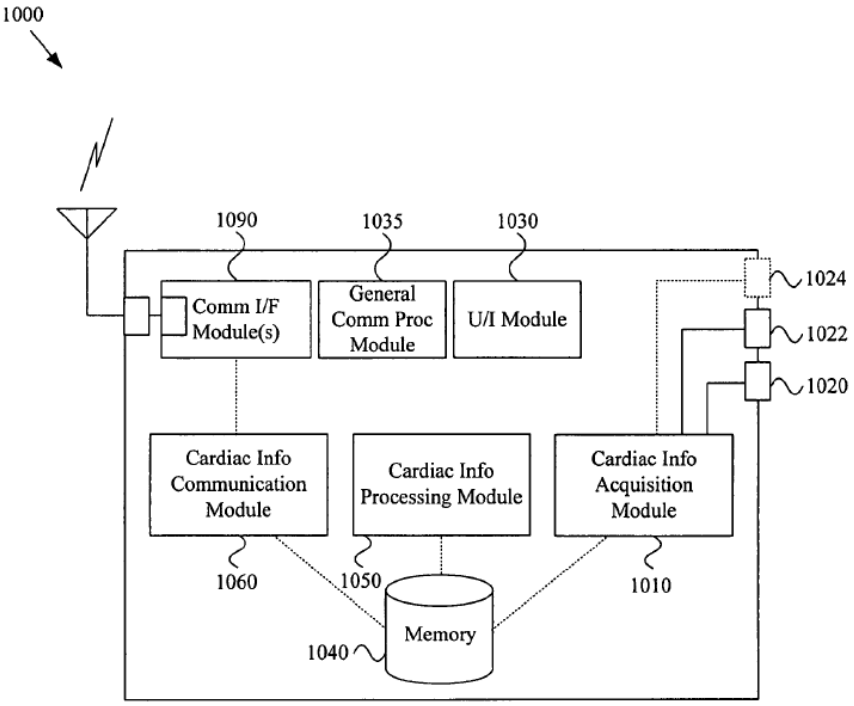

Figure 10

Figure 10 of Markel illustrates portions of an MCD 1000 including 2 or more electrodes. *Id.* ¶¶ 15, 58.

MCD 1000 illustrated in Figure 10 includes a first electrode 1020 and a second electrode 1022 (and, for example, a third or Nth electrode 1024). *Id.* ¶ 58. MCD 1000 may also include a cardiac information acquisition module 1010 coupled to first and second electrodes 1020 and 1022, the module utilizing first and second electrodes 1020, 1022 to detect and acquire various cardiac signals from a user. *Id.* Cardiac information acquisition module 1010 stores the acquired cardiac information in memory 1040. *Id.* ¶ 59. MCD 1000 may further include: a cardiac information processing module 1050 that processes acquired cardiac information; a cardiac information communication module 1060 that communicates acquired cardiac information or analysis results to another system; a U/I module

1030; a general communication processing module 135; and communication interface module(s) 1090. *Id.*

2. Independent Claim 15.

Petitioner presents contentions that claim 15 would have been obvious over the combined teachings of Markel and Mills. Pet. 13, 64–78 (claim 15).

Patent Owner opposes and presents four main arguments: (i) the combination of Markel with Mills relies upon impermissible hindsight, (ii) the Petition fails to provide details regarding the device alleged to result from the combination, (iii) no reasonable expectation of success in combining the teachings of the two references, and (iv) Masimo improperly mixed and matched multiple embodiments of Markel. Prelim. Resp. 10, 20–24. These arguments are addressed after the limitations of claim 15 are examined.

[Preamble] "An electronic device for detecting a user's cardiac signal, comprising"

Petitioner argues Markel discloses a "mobile communication device, general-purpose computer user interface device, and other . . . electronic devices with cardiovascular monitoring capability." Pet. 64 (citing Ex. 1005, code (57), ¶ 35; Ex. 1003 ¶ 110). Accordingly, for the foregoing reasons and on this preliminary record, to the extent the preamble is limiting, Markel supports Petitioner's contentions.

15[a][5] "an enclosure"

Petitioner argues that Markel teaches this limitation. Pet. 64–65. Markel's mobile communication device (MCD) 100 includes a main body

[5] We use the bracketed designations added by Petitioner (*see* Pet. 64–78).

portion 110 as depicted in Figure 1. Accordingly, for the foregoing reasons and on this preliminary record, Markel supports Petitioner's contentions.

15[b] "a display screen exposed to the user through an opening in the enclosure"

Petitioner argues that Markel discloses that the device 100 comprises various user output features such as "a display 140 (which may also function as a touch screen input feature)." Pet. 65 (citing Ex. 1003 ¶ 112; Ex. 1006, Fig. 1). Accordingly, for the foregoing reasons and on this preliminary record, Markel supports Petitioner's contentions.

15[c] "a heart sensor configured to detect the user's cardiac signal"

Petitioner argues that Markel teaches "device 100 may comprise at least one cardiac sensor 'that is adapted to detect cardiac activity of a user' and which is a type of heart sensor that detects a cardiac signal." Pet. 66 (citing Ex. 1005 ¶¶ 35, 58, 82, 103; Ex. 1003 ¶113). Accordingly, for the foregoing reasons and on this preliminary record, Markel supports Petitioner's contentions.

15[c(i)] "the heart sensor comprising: a first lead embedded in a first portion of the enclosure of the electronic device"

Petitioner argues the combination of Markel and Mills teaches this limitation. Pet. 66–73. Petitioner first contends that Markel describes a first pad formed of conductive plastic embedded in a first portion of the enclosure and electrodes for detecting the cardiac signals disposed in various locations, including concealed. Pet. 66 (citing Ex. 1005 ¶¶ 45, 39, 40). These "electrodes may be 'exposed for user contact' or 'may be integrated into various molded components.'" Pet. 67 (citing Ex. 1005 ¶ 37; Ex. 1003 ¶ 114). Petitioner relies on Markel's disclosure "of MCD (device) 400" and

"a first electrode 'placed on or molded into region 410*b*.'" *Id.* (citing Ex. 1005, Fig. 4) (quoting *id.* ¶ 45).

Petitioner relies on Mills as providing additional details and for information on internal components and structures to make the device of Markel. Pet. 69. According to Petitioner, Mills' electrode 14 (discussed above) is similar to Markel's electrodes 410b and 420b. Petitioner, and Mr. Oslan, convey that Mills physical and electrical connections (such as its electrode 14 connected to processing circuitry by a leaf spring 62) would provide a teaching for Markel's internal physical and electrical connections on which Markel is silent. Pet. 69–72 (citing Ex. 1003 ¶ 117). According to Petitioner, "[a] POSITA seeking to implement Markel's device would look to Mill's disclosure for ways to internally connect the electrodes of Markel to internal electronic components using pads," and as such, "a POSITA would utilize the leaf spring 62 taught by Mills to connect the electrodes 410b, 420b of Markel to internal processing components taught by Markel." Pet. 72–73 (citing Ex. 1003 ¶¶ 86, 118).

Petitioner contends that "[a] POSITA would have an expectation of success in the combination as it is a mere rearrangement of known mechanical components in known ways in a complementary device." Pet. 73 (citing Ex. 1003 ¶ 119).

> *15[c(ii)] "wherein the first lead is configured to detect a first electrical signal of the user's cardiac signal via the user's contact with at least one of the first lead and the first portion of the enclosure of the electronic device"*

Petitioner argues that Markel teaches this limitation in light of Mills. Pet. 73–74. Petitioner contends that Markel discloses first electrode 2024 that detects and acquires various cardiac signals from a user and that the

electrodes can detect cardiac activity of a user through touching the electrodes. Pet. 73 (citing Ex. 1005 ¶¶ 35, 68).

> *15[c(iii)] "the heart sensor comprising . . . a second lead embedded in the display screen of the electronic device"*

Petitioner argues that Markel teaches that the enclosure or housing of MCD 100 supports display 140 and that an electrode may be integrated or embedded into the touch screen of display 140. Pet. 75–76 (citing Ex. 1005, Fig. 1, ¶¶ 44, 75, 78).

> *15[c(iv)] "wherein the second lead is configured to detect a second electrical signal of the user's cardiac signal via the user's contact with at least one of the second lead and the display screen of the electronic device"*[6]

Petitioner argues that Markel teaches that an electrode is integrated or embedded into a touch screen display that this electrode can detect cardiac activity of a user that is conductively coupled to the electrodes. Pet. 76 (citing Ex. 1005 ¶¶ 44, 78).

Accordingly, for the foregoing reasons and on this preliminary record, Markel and Mills support Petitioner's contentions that Markel and Mills teach limitations 15[c(i)], 15[c(ii)], 15[c(iii)], and 15[c(iv)].

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[6] Petitioner incorrectly reproduces this limitation at Petition 76. Whether these omissions are material for claim 15, or any other claim not properly reproduced, will be addressed in a final decision. *See, e.g.*, Pet. 73 (omitting "is configured to detect"), Pet. 76 (omitting "configured to process").

15[d] "a processor coupled to the heart sensor and configured to process the first and second electrical signals of the user's cardiac signal"

Petitioner argues the combination of Markel and Mills teaches this limitation. Pet. 76–78. Petitioner relies on Markel's disclosure that "an electronic device 2000 that may 'comprise a cardiac information acquisition module 2010 [and] various cardiac sensors (e.g., electrodes) 2020, 2022, 2024.'" Pet. 76 (citing Ex. 1005 ¶ 110). "According to Markel, such modules or sensors are utilized to acquire (receive) and process cardiac information from the user of the electronic device." *Id.* at 76–77 (citing Ex. 1005 ¶¶ 110, 111).

Petitioner also cites Mills as disclosing a VLSI circuit chip that includes an ECG signal and abnormal event detection circuitry, AD and DA conversion circuitry, as well as a memory and processor circuitry. Pet. 77 (citing Ex. 1006, 2:1–8). Petitioner contends that "[a]s an alternative to the processing disclosed in Markel, it would have been obvious to use the internal componentry of Mills as a substitute as Mills provides more specific implementation details missing from Markel." Pet. 78 (citing Ex. 1003 ¶ 124).

Accordingly, for the foregoing reasons and on this preliminary record, Markel and Mills support Petitioner's contentions.

Patent Owner's Contentions

Patent Owner contends that Masimo's position is "hindsight-based reconstruction of the claims, at least because the relied-upon 'motivation' is merely a suggestion by Masimo that a POSITA *could* have combined teachings of the two references, rather than a demonstration that the

POSITA actually *would* have combined the teachings of the two references." Prelim. Resp. 11.

Patent Owner argues Petitioner has failed to meet its burden for claim 15 because "[Petitioner] relied upon two different embodiments of Markel for Elements 15[c.1] and 15[c.2], without explaining why it would have been obvious to a POSITA to combine those two embodiments." *See* Prelim. Resp. 20–24. Similarly, Patent Owner argues Petitioner has failed to meet its burden for claim 15 because Masimo improperly mixed and matched multiple embodiments of Markel without explaining why modifying one embodiment based on the other would have been obvious. *Id.* Specifically, Patent Owner contends that "Masimo fails to explain why a POSITA would have modified the telephone shown in Markel's FIGS. 4 and 5 based on disclosure provided with respect to the computer display device shown in Markel's FIG. 15." *Id.* at 23.

Analysis

As to Patent Owner's first contention that Masimo's provided motivation for combining Markel and Mills is merely a suggestion that a POSITA could have combined teachings rather than a demonstration that the POSITA actually would have combined the teachings of the two references (Prelim. Resp. 11), we see some merit to this position. Petitioner conveys that Mills provides details of internal connections including the use of a leaf spring with a top pad portion and person of ordinary skill in the art would look to Mills teaching "because Mills provides details of internal physical connections on which Markel is silent." Pet. 72, 47, 50. Petitioner then provides attorney argument concerning how "[l]eaf springs are well known electrical connectors commonly used in the art," without citation to evidentiary support. Pet. 72. Petitioner's justification for combining

references – that "Markel is silent" – may not be a sufficient basis or reason to combine Mills teachings with Markel as it appears hindsight driven in the absence of corroborating evidence. *Id.*

We will determine after a complete trial whether Petitioner establishes sufficiently that the use of Mills' leaf spring in the housing of Markel was simply "a mere rearrangement of known mechanical components in known ways in a complementary device." *See* Pet. 48, 73; Ex. 1003 ¶¶ 87, 119. Currently, Patent Owner's arguments to the contrary alleging insufficient details appear to be attorney speculation. Prelim. Resp. 13–19. Patent Owner alleges "the proposed combined device in reality would have been understood to result in complications." *Id.* at 13. For example, Mills does not teach using two leaf springs for connecting both its two electrodes to the PCB as in the proposed combination.

We prefer to address these complications, and whether Petitioner has established that the benefit of the proposed combination outweighs these complications, on a completed record. For example, Patent Owner's attorney argument suggesting the configuration of Mills (two electrodes positioned on opposite sides of a frontal plane but also parallel to the frontal plane) and Markel (first electrode on a left portion and second electrode on a right portion) would be more than a mere rearrangement of known mechanical components in known ways lacks evidentiary support showing why the dimensional and structural changes are not within the knowledge of the person of ordinary skill in the art, as Mr. Oslan testifies. *See* Ex. 1003 ¶¶ 118, 119.

With respect to claim 15, Patent Owner also contends that Petitioner improperly mixed and matched distinct embodiments of Markel without a rational basis. Prelim. Resp. 20.

Based on the preliminary record before us, Petitioner has shown sufficiently that Markel Figure 4 appears to disclosure generally the same embodiment as that in Figure 15 directed to "an exemplary computer display device." Ex. 1005 ¶ 78. Similar to the embodiment of Figure 4 (electrodes molded into side portions), Figure 15 may have "an electrode 1510 on a border portion of the display device 1500," or an "electrode 1530 on a first side of the display device 1500." *Id.*

Further, just as Figure 15 discloses "electrodes 1540 on a touch screen portion of the display device 1500," the embodiment of Figure 4 seemingly contemplates having electrodes placed on a video display device (integrated into a touch screen) and "[a] plurality of electrodes (or other sensors) may be disposed in any of a variety of locations." *Id.* ¶¶ 78, 44, 45; *see also* Pet. 75 (citing Ex. 1005 ¶¶ 44, 78).

Summary

For the foregoing reasons, we are persuaded that Petitioner's cited evidence demonstrates a reasonable likelihood that Petitioner would prevail in its obviousness contentions regarding claim 15.

3. Independent Claim 1.

As we preliminarily conclude that Petitioner demonstrates a reasonable likelihood of prevailing with respect to its obviousness challenge to independent claim 15 as rendered obvious by Markel and Mills, we institute review on all challenged claims on all grounds set forth in the Petition, including Petitioner's challenge to claim 1 as rendered obvious by

Markel and Mills. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1354 (2018); *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018).

4. Dependent Claims 2–4, 8–14, and 16–22.

Petitioner also contends that claims 2–4, 8–14, and 16–22 would have been obvious over Markel and Mills. Pet. 13, 54–64, 78–84.

As we preliminarily conclude that Petitioner demonstrates a reasonable likelihood of prevailing with respect to its obviousness challenge to independent claim 15, we institute review on all challenged claims on all grounds set forth in the Petition, including Petitioner's challenge to claims 2–4, 8–14, and 16–22 as rendered obvious by Markel and Mills. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1354 (2018); *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018).

III. CONCLUSION

The Supreme Court held that a final written decision under 35 U.S.C. § 318(a) must decide the patentability of all claims challenged in the petition. *SAS*, 138 S. Ct. at 1348. After considering the evidence and arguments presented in the Petition, we determine that Petitioner has demonstrated a reasonable likelihood of success in proving that at least one claim of the '257 patent is unpatentable. Accordingly, we institute an *inter partes* review of all claims and all grounds set forth in the Petition. *See* 37 C.F.R. § 42.108(a) ("When instituting . . . review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.")

At this stage of the proceeding, we have not made a final determination as to the patentability of any challenged claim or as to the construction of any claim term.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–4 and 8–22 of the '257 patent is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of the '257 patent shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

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